Research & Innovation

“Launching new themes”
Knowledge Agenda & Annual Plan 2020

Alice Fermont, Jan Peter van der Hoek, Harry de Brauw, Enna Klaversma, Alex van der Helm, Tim Pelsma, Roderik Bijlard, Anne Marieke Motelica, Hidde Schijfsma

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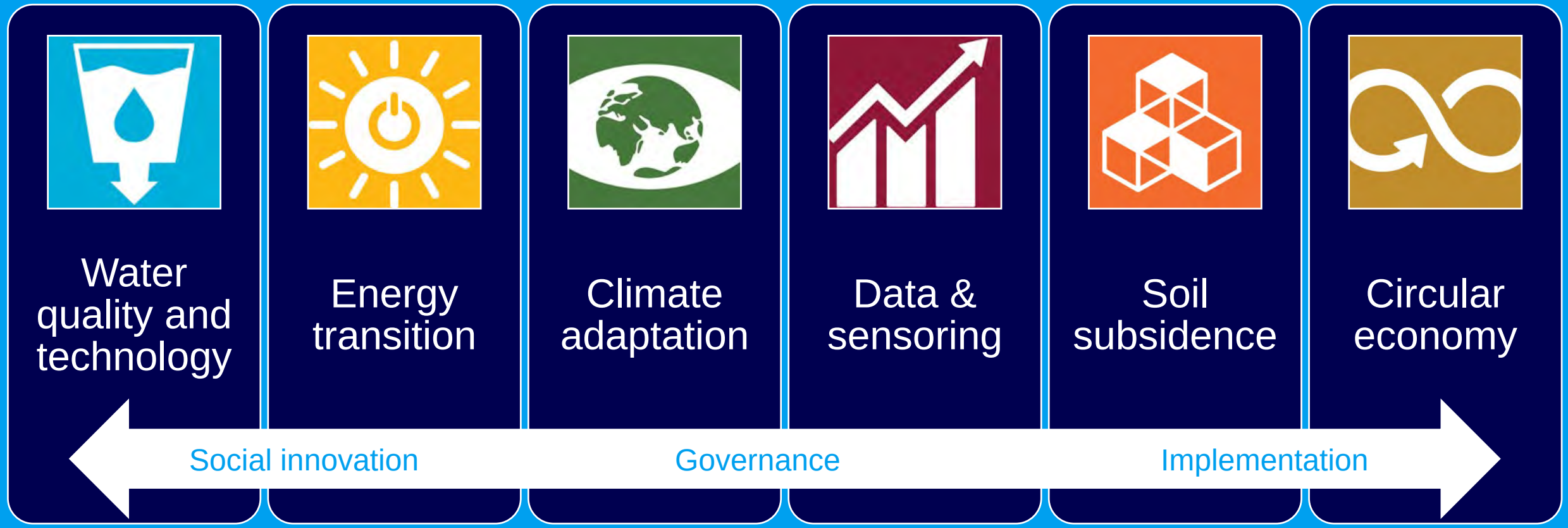
Research & Innovation

Waternet innovates and develops expertise on behalf of the Regional Water Authority Amstel, Gooi and Vecht (AGV) and the City of Amsterdam. Our programme focuses on improving the quality and availability of drinking water, transport and treatment of wastewater, keeping surface water clean and maintaining dikes and flood defence systems. In addition to efficiency and and excellent services, we are committed to sustainability, which is a driving force behind much of our research and innovation. We want to reduce our carbon emissions and contribute to the energy transition by using aquathermal energy. We also have high ambitions for recovering energy and raw materials from the water cycle and minimising waste using circular methods. We have started to digitise processes, which should lead to data-driven decision-making and operations. By 2050, we will work in a climate-adaptive manner. The challenges posed by climate change, such as water shortages and flood protection, are considerable. This calls for technological and social innovation. By doing so, we contribute to the innovation ambitions of both AGV and the City of Amsterdam. It also offers excellent opportunities for cooperation with our innovation partners. Through working together we can get more out of water!

The new themes



Our core task is to ensure the quality, safety and availability of water, and research and innovation are essential in order to achieve this. This also allows us to respond to social developments and challenges. We can only achieve technological innovations if we pay sufficient attention to social innovations, governance and the implementation of the innovations. We will address these issues within each of the themes.

Themes & finances

Waternet has six new themes: Energy transition, Climate adaption, Data & sensoring, Water quality & technology, Soil subsidence and Circular economy.

For 2020, the Water Authority AGV and the City of Amsterdam have made a budget of €0.99 million and 9100 hours available for this purpose.

The Regional Water Authority AGV and the City of Amsterdam have high ambitions for the future. There has been a sharp increase in demand for research and innovation, and this trend is set to continue. It is for this reason that the budget for 2020 increased with €300,000 compared to the 2019 budget.

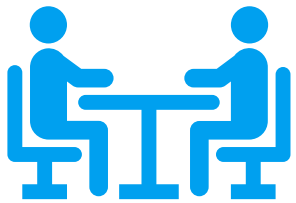
The table provides an initial indication of the allocation of budgets across the various Research & Innovation themes. Given the fact that we are in the start-up phase of the programme, adjustments may be made during the course of the year.

2020 Budget	SDG*	Hours	Theme costs k€
Energy transition Theme leader: Harry de Brauw		2000	150
Climate adaptation Theme leader: Roderik Bijlard		750	50
Data & sensoring Initiator: Alex van der Helm		1250	75
Soil subsidence Theme leader: Tim Pelsma		750	50
Circular economy Theme leader: Enna Klaversma		1000	100
Water quality and technology Theme leader: Anne Marieke Motelica		750	50
Strategic partnerships Theme leader::Jan Peter van der Hoek		200	390
Management & communication Theme leader: Alice Fermont		2400	150
R&I budget		9100	990

* The UN Sustainable Development Goals (SDG) symbols refer to innovation themes.

Programming and consultation structures

Waternet strives for a healthy balance between innovation and optimisation. Optimisation takes place via the value chain; innovation is realised through the Research & Innovation (R&I) programme. Research is of great importance for both aspects. This is why good coordination between the R&I programme and the value chain is an important success factor.



Programming consultations:

Twice a year (R&I managers, internal revenue owners, theme leaders, director of international knowledge track)

Consultations between theme leaders:

Every month (theme leaders and R&I managers)

Submitted to the Management Team (MT) – client:

Annual Plan, once a year

Reports, twice a year (interim report and annual report)

Information to Executive Board (EB) of AGV:

Via portfolio holders' meeting

Information to Governing Board of AGV and Board of the Waternet foundation:

Via Management Team of Waternet and EB of AGV

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Organisation of Research & Innovation

External revenue owner
KWR, TU Delft, etc.

Internal revenue owner
Programme Managers of Waternet-wide programmes
Value chain directors

Resources Manager: money
R&I budget holder
Programme Managers of Waternet-wide programmes
Policy & Assets
Research & Advice

Resources Manager: staff
Policy & Assets
Research & Advice
Projects
IT

Official contracting party
The MT – Roelof Kruize

Research and Innovation Programme
Jan Peter van der Hoek
Alice Fermont

Contractor 1
R&I theme leader

Project manager
Project manager of specific research project

Project team
Project team members

Programme support
Hidde Schijfsma
Hannie Atema (finances)

Contractor 2
R&I theme initiator

Project manager

Project team

Strategic partnerships

“Waternet is committed to innovation. Innovations contribute to efficiency, sustainability and service. Rather than aiming to be an innovation centre itself, Waternet aims to be active within a sophisticated innovation network, driven by its own powerful R&I team. Strategic partnerships, including those with knowledge institutions, are a permanent feature of this innovation strategy. Progress and innovation are crucial. In order to respond to new developments as effectively as possible, the R&I themes have been updated and six new themes will be launched in 2020.”

Jan Peter van der Hoek

Waternet participates in collective research programmes such as the KWR Joint Research Programme (*Bedrijfstakonderzoek*, BTO), the research programme led by dune water companies (DPWE) and programmes led by STOWA (Foundation for Applied Water Research) and RIONED. We also contribute to:

- Knowledge Action Programme (KAP)
- Waternet strategic sessions
- Professorship of Drinking Water & Urban Water Cycle Technology, TU Delft
- AdOX (use of zeolites for the removal of contaminants of emerging concern (CECs) from wastewater and regeneration with ozone), TU Delft
- Extraction of cold from drinking water, TU Delft
- Smart monitoring, UvA
- Cities in transition, Pakhuis de Zwijger
- Wetsus, Platform agreement
- Amsterdam Institute for Advanced Metropolitan Solutions (AMS)
- Slow Sand Filtration for the Next Century, TU Delft and WUR
- Projects associated with the Top Sectors for Water and Energy

Water quality and technology

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Water quality and technology: Focus

Ensuring the sustainable management of the watercycle is one of Waternet's top priorities. An excellent supply of drinking water, wastewater collection, wastewater treatment and water system management represent the pillars of Waternet's activities. However, water quality and biodiversity are under threat: new substances, such as pharmaceutical residues and plastics, well-known substances, such as nutrients and pesticides, industrial discharges and sewer overflows threaten the ecological quality of surface water and thus threaten biodiversity and sources of drinking water. The construction and maintenance of infrastructure also present challenges. Measures for water management as well as applications of new water technologies are needed in order to safeguard the provision of clean water for humans, animals and the environment.

Objective of the Water quality and technology theme

Create a sustainable approach to water cycle management. Protect sources of drinking water and water quality to provide healthy habitats for plants, humans and animals, through excellent wastewater processes and drinking water supplies and effective water system management.

Water quality and technology: Knowledge Agenda

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Research question	Category
What can we do about the Top 5 barriers (threats) to achievie good (surface and drinking) water quality, both now and in the future?	Water quality
How can we improve the quality measures for our (surface) water?	Water quality
How can we improve our understanding of the state and functioning of (surface) water quality and biodiversity, for example through the automation of analyses, eDNA, open data?	Water quality
How can we exploit brackish seepage in the water cycle?	Source
How can we use the effluent from wastewater treatment plants (WWTPs) as a source for industrial water applications?	Source
How can we use the second Waterleidingplas as a source of drinking water?	Source
How can we make our water technologies more sustainable and efficient? What technologies for drinking water and wastewater will be used in the future?	Technology
How can we make our infrastructure more sustainable?	Technology
How can we improve the efficiency of existing and new systems for the removal of phosphates from surface water using pilot research installations?	Technology
How can we combine phosphate recovery with hydrothermal energy in deep lakes?	Technology

Water quality and technology: Projects in 2020

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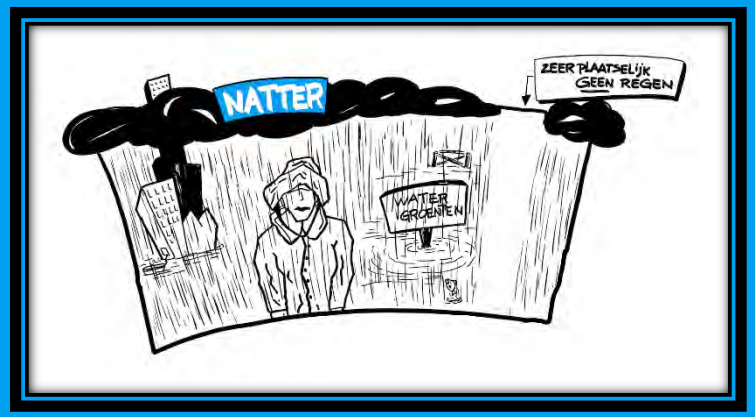
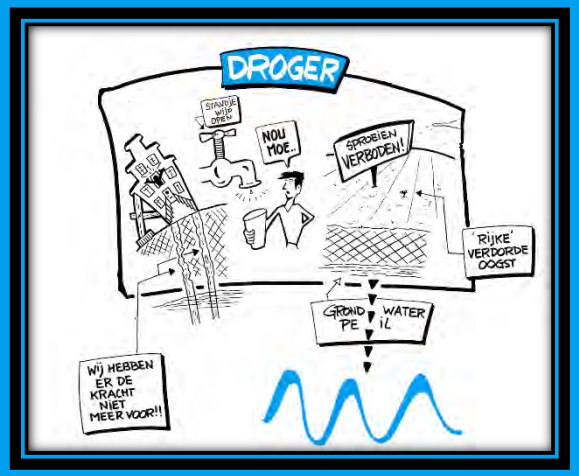
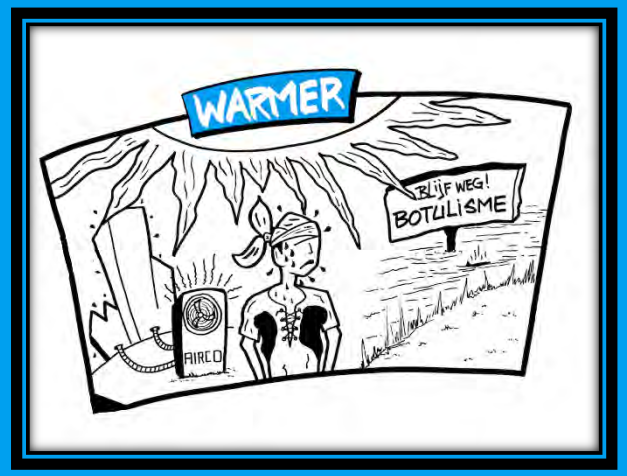
Research	Category
Current projects	
Slow sand filtration	Water quality
Model for P load in lakes (PCLake)	Water quality
Preventing bank erosion	Water quality
Brackish seepage	Source
Testing line at the WWTP in Amsterdam-West (including nitrous oxide emissions)	Technology
Real-Time Control	Technology
Study in the Amsterdam region	Technology
Combination of ozone and activated carbon filters as the fourth step in wastewater treatment (O3GAC)	Technology
Phosphate removal system, “Zwemlust” swimming pool	Technology
New projects	
Dissolution of lead and brass	Water quality
Development of new lobster trapping measures	Water quality
Study on gas emissions; methane and nitrous oxide	Technology
Development of inspection techniques to determine the state of maintenance	Technology

Climate adaptation







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Climate adaptation: Focus

The climate is changing: we are seeing more extreme rain events, longer periods of drought and higher temperatures. Water cycle management will have to adapt to a changing climate.

Objective of the Climate adaptation theme

By 2050, the field in which Waternet operates will be climate-adaptive and resilient. That means:

- Minimal social disruption and damage in the event of floods, extreme weather conditions (rain, drought and heat) and long-term climate effects, such as rising sea levels, soil subsidence and increasing fluctuations in groundwater levels.
- Exploitation of climate effects and adaptive measures for creating an appealing living environment.

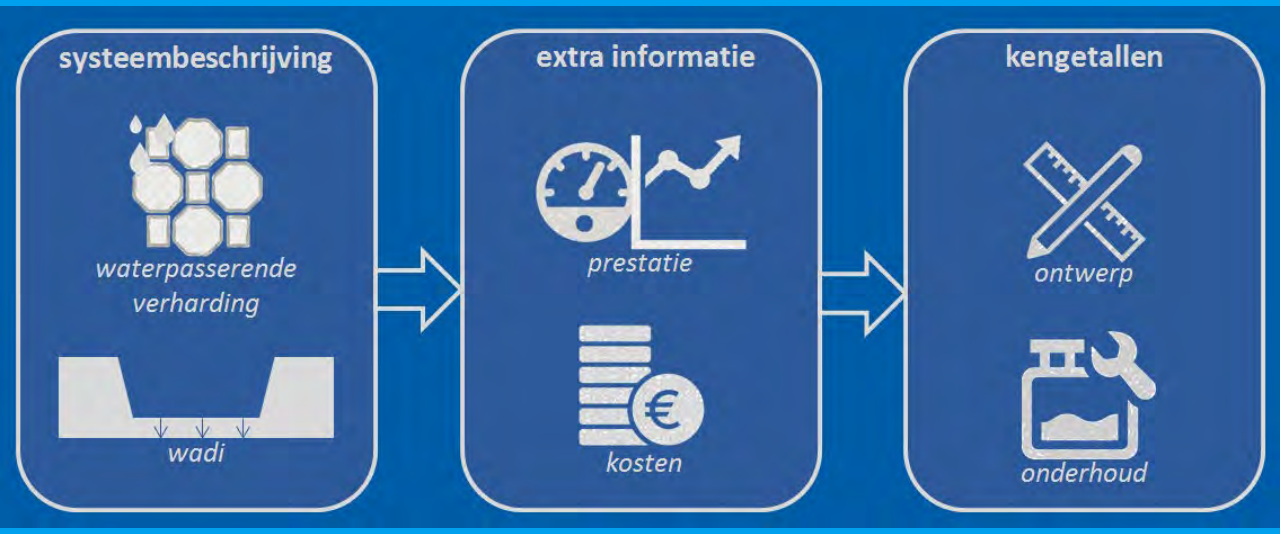
Aim of the Climate adaptation theme:

- As part of the innovation process, we will investigate new techniques, products and processes that can help to tackle the climate adaptation challenge.
- Not only do we want these innovations to gain support, but we also want to receive feedback on them, so that we can improve the innovations based on the insights of those involved and on practical experience. Cooperation with our area partners is essential in order to achieve this.

Climate adaptation: Knowledge Agenda

Research question	Category
What will the future governance structure (role of Waternet) look like with regard to potential climate-adaptive facilities in public/private spaces?	Social, collaboration
What is a sustainable strategy for modelling the water cycle?	Heat, drought, flooding
How can we distribute water in an intelligent way, based on (water) demand and availability?	Heat, drought, flooding
Which innovative techniques in public/private spaces contribute to rainwater harvesting and heat management?	Heat, flooding
How much demand will there be for drinking water during drought and heat? How can we meet that demand?	Drought, heat
What impact do rising sea levels and fluctuating river discharges have on our assets and what scenarios are there to mitigate the consequences in collaboration with the Delta programme and Amsterdam Metropolitan Area?	Flooding
How vulnerable are our assets to the effects of climate change and which innovative measures could be taken?	Heat, drought, flooding

Climate adaptation: Projects in 2020



Current projects:

- City Deal climate adaptation on behalf of the City of Amsterdam
- Top Consortium for Knowledge and Innovation (TKI) – Water storage in sports fields
- TKI – Green-blue schoolyards
- Various water detention facilities

Exploratory projects:

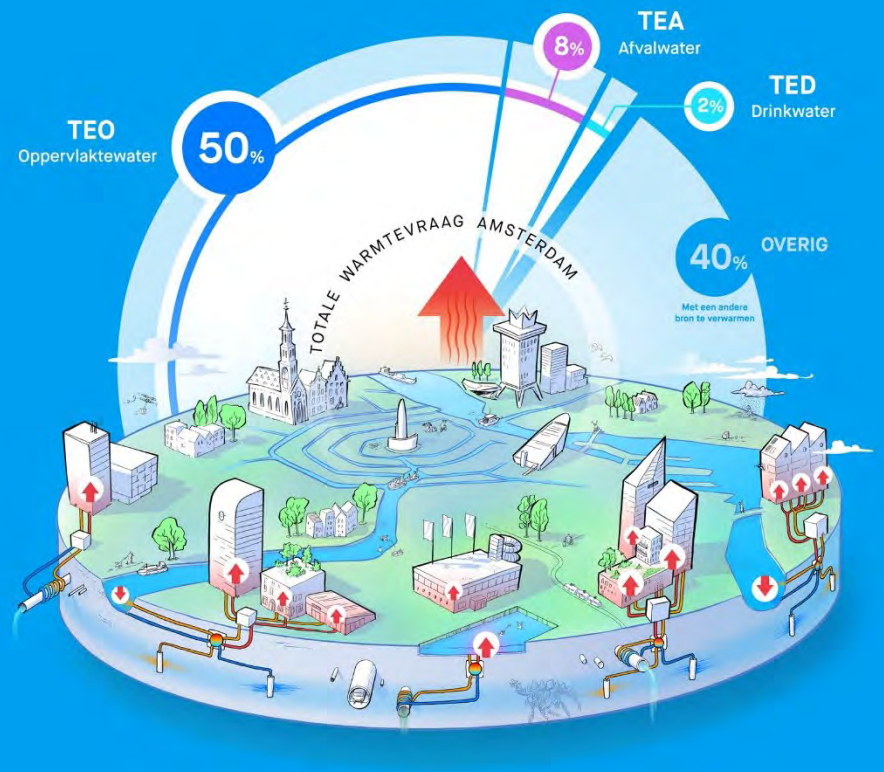
- New governance for micro water management
- Sustainable modelling infrastructure to respond to shifting needs
- Distribution and re-use of rainwater and grey water whereby we establish a relationship between cities and rural areas.

Collaborative projects:

- Urban Photosynthesis Project
- Schepenkwartier and butterfly garden.

Energy transition

The energy potential of aquathermal energy for existing cities



Energy transition: Focus

The transition to being free of natural gas can only be achieved if there is a heat transition. Thermal energy from the water cycle – aquathermal energy – can contribute substantially to this. Waternet could also harness its expertise in the field of underground pipeline infrastructure to develop and operate public heating and cooling networks. Within this theme, we are working on pilots for the application of aquathermal energy and for the realisation of open low-temperature heat networks (LT networks) in which, in addition to aquathermal energy, heat generated by data centres can also play a role. In addition to aquathermal energy, we also focus on energy projects that contribute towards Waternet's positive energy management.

Objective of the Energy transition theme

1. Thermal energy:
Balancing demand for heating and cooling via aquathermal energy combined with primary tasks.

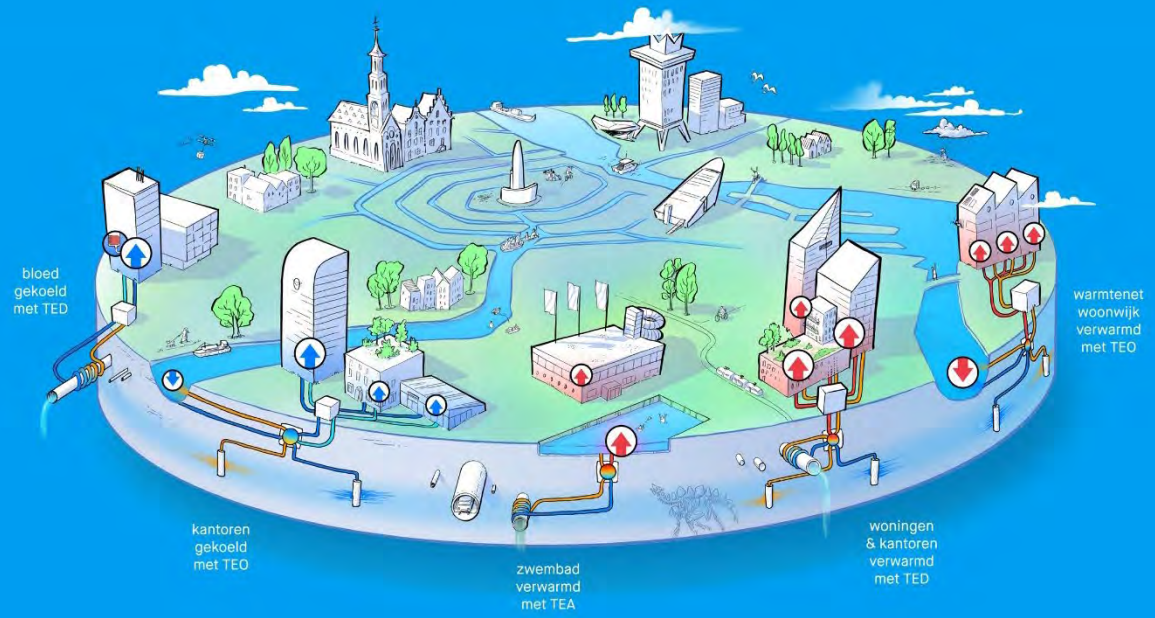
2. Other energy:
Waternet – energy positive/free of natural gas

Energy transition: Knowledge Agenda (1)

Thermal energy

Aquathermal energy

Our water cools and heats the city



Research question	Category
What is the potential of aquathermal energy?	Potential
How does thermal energy from TEO affect the temperature of surface water?	Potential
How does TEO affect the quality of surface water and ecology?	Water quality
How can TEO be combined with additional treatment steps?	Water quality
How do different heat sources compare to each other: financial, spatial, risk, etc.?	Strategic
What is a good source strategy for TEO, TEA and TED?	Strategic
What opportunities are there for realising low-temperature heat networks?	Strategic
What needs to be undertaken internally in order to be able to manage heat projects?	Strategic
How can we structure the inflow and outflow of TEO?	Technical
How does the drinking water network differ from a source network and an LT network?	Technical
Are there alternatives for legionella prevention?	Safety
How do external sources affect the temperature of drinking water?	Safety

TEO: Thermal energy from surface water
TEA: Thermal energy from wastewater
TED: Thermal energy from drinking water

Energy transition: Knowledge Agenda (2)

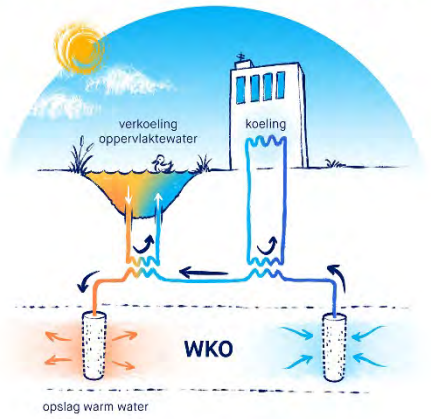
Other energy

Research question	Category
Can we pump at lower speeds using smaller pumps and thereby reduce power consumption at pumping stations?	Reduction of energy consumption
What opportunities are there for digitising the management of water systems, so that less travelling is required (reducing workload)?	Reduction of energy consumption
Can we generate power from the potential energy in our water streams?	Generating sustainable electricity
Do we have any excess land available that Liander can use for transformer stations?	Availability of electricity
How can we store electricity for the short and long term?	Availability of electricity
Is it possible to replace back-up diesel generators at pumping stations with a sustainable alternative?	Emission-free Waternet
How can we make our heavy transport more sustainable?	Emission-free Waternet
How can we heat pumping stations and listed buildings without gas?	Emission-free Waternet
What possibilities are there for fermentation?	Future of the WWTP
What possibilities are there for hydrogen and fuel cells at WWTPs?	Future of the WWTP
How flexible are WWTPs for managing the availability of electricity?	Future of the WWTP

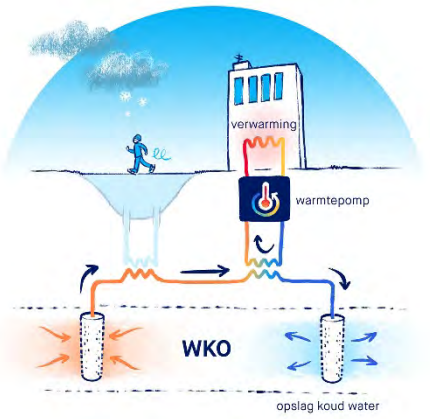
Energy transition: Projects in 2020

Thermal energy

Warmte winnen en koelen gebouw



Verwarmen gebouw



Current projects:

- Creating an ambient heat map
- Determining the potential of aquathermal energy
- Effect of external factors on drinking water temperature

New projects:

- 3D modelling of water systems
- Insights into the impact of TEO on surface water temperature: various measurements in surface water systems
- Insights into the impact of TEO on water quality and ecology: Sloterplas pilot project
- Combining TEO with additional treatment step: Sloterplas pilot project
- Insights into the characteristics of different heating techniques: financial, spatial, disturbance/nuisance, etc.
- Identify opportunities for seasonal thermal energy storage
- Pooling of existing knowledge acquired from projects
- Alignment with permit requirements, development of a format for hydrothermal applications

Energy transition: Projects in 2020

Other energy

Current projects

- Realisation of solar parks
- Preparations for the construction of windmills

New projects

- Study into the possibilities of continuously pumping at low flow speed using a small pump at pumping stations. Is this feasible for our assets? What are the savings?
- How can heavy transport be made more sustainable? What possibilities are there already, and what can we expect?
- Can electricity be generated from potential energy water flows, e.g. from gravity systems for effluent at the Amsterdam-West WWTP? Where is it possible, what will it cost, what will it produce?
- Do we have available land that Liander can use to install medium-voltage substations?

Circular economy

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12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Circular economy: Focus

From Take-Make-Waste to Reuse-Recover-Recycle. This also requires action to be taken in the water cycle. The Netherlands has set itself the target of using 50% fewer primary raw materials by 2030, as a prelude to achieving a fully circular economy by 2050. But what does that mean for Waternet? Which of the raw materials that we use today have the greatest impact on the environment and should be phased out? And what about all the waste and residues we produce? Can any of that be reused? Or can we reorganise our processes in such a way that no waste is generated? In addition to these questions, which are more focused on the short term, within this theme we are also working on more strategic research questions related to the future structure of the water cycle.

The theme will tie in with the Circular Economy Programme, which is currently being developed. The results of the studies will contribute to this.

Objective of the Circular economy theme

Reorganise the operation of the water cycle so as to achieve a 50% reduction in environmental impact by 2030 through the use of raw materials and achieve a full circular economy by 2050 (no use of primary raw materials and no waste generation).

Circular economy: Knowledge Agenda

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Research question	Category
Review several studies from the past, for example about lime milk from calcite pellets or the application of membranes: do they help to reduce the impact?	Reduce impact
Based on a Life Cycle Assessment (LCA), how do different materials used for sewage pipes impact the environment?	Reduce impact of (cast) iron
Is it possible to use a combination of ultra filtration (UF) and windmills?	Reduce impact of FeCl3
What is the most sustainable construction material for a pumping station? (Carry out LCA)	Reduce impact of concrete
What waste flows are produced and what is the impact of their processing route?	Reduce impact of outgoing flows
How can we use dredge spoil in a circular way?	Reduce impact of outgoing flows
Can we make products from sewage sludge, swirling sludge and ground sludge (*riool-, kolken- en gemalenslib*, RKG sludge)?	Reduce impact of outgoing flows
Is New Sanitation the future (for Amsterdam/Waternet)?	Strategic
Can urine be collected and processed differently?	Strategic
How can you measure circularity?	General

Circular economy: Projects in 2020

Current projects:

- Circular dredge spoil, STOWA study initiated
- Strategic research into New Sanitation (is it the solution for Amsterdam/Waternet?)
    - SENSE subsidy project – social aspects
    - ATELIER subsidy project – vacuum sewage system in Buiksloterham (BSH)
    - Wider Uptake subsidy project – using and monitoring bank protection made from bio-composite materials from our cuttings
- Alternatives to phosphate removal at Loenderveen (reduce impact of FeCl3)

New projects:

- Review of alternatives to NaOH for softening
    - The application of both lime milk and membranes was reviewed in 2015 and proved to be unfeasible. Is this still the case in 2020?
- Various LCA studies and other inventories:
    - materials used for sewage pipes
    - alternatives to a standard pumping station
    - impact of all outgoing flows
- Re-examination of the possibilities of using RKG sludge to make products.
    - Despite positive results a few years ago, there was no follow up. The old results and the latest insights will be re-examined.
- (Literature) study into various ways of measuring circularity and converting that into (specific) objectives for Waternet.

Soil subsidence

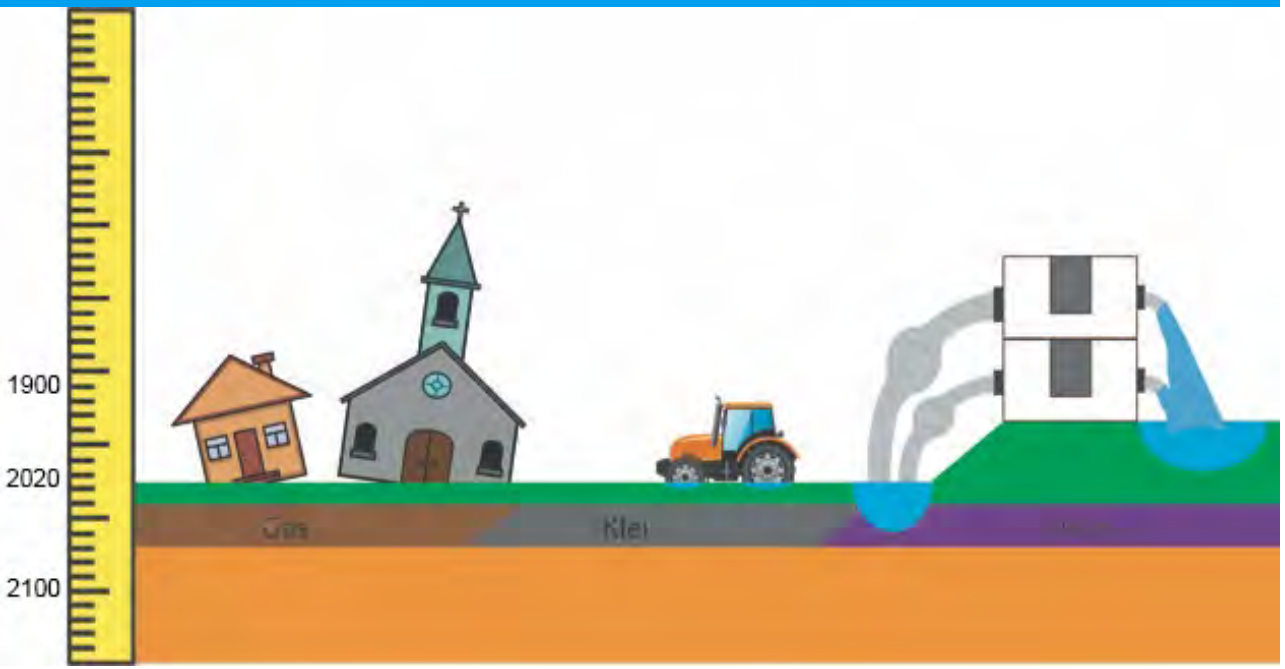

Image: https://nationaalwatertraineeship.nl/overnwt/projecten/heel-holland-zakt

Soil subsidence: Focus

A large part of the Netherlands is peatland, which is susceptible to subsidence. Besides negative effects on buildings, roads and farmland, but it also releases a lot of greenhouse gases. For this reason, we want to curb soil subsidence and, where possible, restore the peatland.

This requires a socially accepted approach that actually slows down soil subsidence as much as possible. There is still a lack of knowledge regarding which methods to use and how to implement them.

The AGV board has identified three pillars for soil subsidence:
1) reduced indexing or take measures to combat soil subsidence
2) actively participate in the regions to undertake open area processes in collaboration with other public authorities
3) gain experience with measures in pilot projects.

In the Dutch Climate Agreement, a target has been set for peat meadow areas to achieve a reduction of 1 Mt in carbon emissions by 2030.

Objective of the Soil subsidence theme

Develop a (socially) accepted set of measures to combat soil subsidence. Measures will be tested and have to be effective against both soil subsidence and greenhouse gas emissions. Within five years, Waternet will know how to manage (ground) water and how to reconcile governance issues, i.e. sufficient water and clean water.

Soil subsidence: Knowledge Agenda

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Research question	Category
What is an effective high water level for the summer months in terms of curbing soil subsidence and reducing CO_2-eq emissions?	Quantity and water management
What impact will re-wetting peatlands have on flooding?	Quantity and water management
How can we develop a better modelling approach in which groundwater, measures against soil subsidence and crop yield are included (per plot)?	Quantity and water management
How can we prevent uneven subsidence in polders?	Quantity and water management
What is the relationship between soil subsidence and water quality (nutrient leaching), for different land uses and measures against soil subsidence?	Soil and water quality
What type of emissions are released from peat & surface water and how is this linked to (the curbing of) soil subsidence?	Greenhouse gases
How can we ensure that we find the best solution?	Governance
What is the relationship between heat, drought and soil subsidence? What are the consequences of more heat?	Climate adaptation
What is the maximum synergy between curbing soil subsidence and increasing biodiversity (landscape scale)?	Biodiversity
Which method should be used for active groundwater management in urban areas?	Physical subsidence

Soil subsidence: Projects in 2020

Projects	Category
Current projects	
Wet cultivation in Ankeveen	Land use
Monitoring peat infiltration/underwater drainage*	Effects of physical subsidence
Re-Peat* (simulation program that provides insights into the effects of peat subsidence)	Effects of physical subsidence
Insar (radar technique) for measuring soil subsidence	Effects of physical subsidence
New projects	
Participation in research into methane from ditches (in collaboration with research organisation NWO)	Greenhouse gases
Measurement grid for shallow groundwater in peatland*	Effects of physical subsidence

Data & sensoring

Data and sensoring: Focus

Digitalisation of the water cycle is already underway. We are pursuing data-driven decision-making processes and data-driven business operations. The intelligent use of all data from the water cycle, combined with data from other sources, and the use of sensors present excellent opportunities to take this digitalisation process a step further. Waternet will use new technology to collect and share information. This will create a pressure cooker situation in which new knowledge is generated, which in turn will result in data-driven decision-making processes and data-driven business operations.

Objective of the Data and sensoring theme

Waternet aims to be fully data-driven by 2024; i.e. our decision-making processes will be completely based on facts and our operations will be based on data. This will help us to organise our processes better and more cost-effectively, to manage our operations more efficiently and effectively and to serve our clients and customers better.

Data & sensoring: Knowledge agenda

Research questions	Category
What will be the future innovations in the process from sensor to end user (customer/employee/asset)?	Exploration
What is the best way to collaborate on modelling and to share data with colleagues and citizens?	Collaboration
Which new measurement methods or external data can contribute to the R&I themes, e.g. for drought, soil subsidence, 3D surface water quality for heat and cold discharges etc.?	Information gathering
Can sonar data be used to determine ecological parameters and the build-up of layers of sludge on the water bed?	Information gathering
Can data lineage be used, for example, to support financial projections, to justify dyke maintenance or to make decisions regarding dredging? How can we apply that within Waternet?	Monitoring
How can RPA (Robotic Process Automation) software be used to automate repetitive operations, and what benefits will that generate?	Automation
Which current and future technological developments should Waternet adopt in order to improve and further automate customer interaction, such as Google Home, Alexa, Siri, speech-to-text technology, etc.?	Automation
Can we use AR (Augmented Reality) to ‘see’ the groundwater level in the field in real time, for example?	Modelling
In the future, business processes will be completely interconnected, both physically and digitally, and supported by real-time predictions. This is only possible if there is a digital twin of the processes. To what extent are the current modelling environments used at Waternet suitable for use in a continuous process as part of the digital twin?	Modelling
How can AI (Artificial Intelligence) improve customer service, for example by integrating AI in the chatbot or predicting customer behaviour?	Modelling
What will future reports look like for our colleagues, customers, stakeholders and suppliers, which can be generated at any time with real-time (open) data?	Accessibility of information

Data & sensoring: Projects in 2020

Projects	Category
Current projects	
New measuring methods	Information gathering
3D water quality	Information gathering
Testing and implementing hydrogen drones	Gathering and accessibility of information
New projects	
Data lineage pilot	Monitoring
Insights into groundwater levels	Modelling
RPA pilot	Automation
Collaboration on modelling and code	Collaboration and accessibility

Communication & organisation

The organisation of Research & Innovation within Waternet and communication about it is financed from the research and innovation budget. The activities consist of:

- Reviewing the research and innovation programme
- Drawing up the annual plan, the annual report and various interim reports
- Financial monitoring of the programme
- Sharing and communicating knowledge about innovation (via lunch lectures, the website, intranet and social media)
- Organising the thematic meetings
- Installing the demonstration pod for decentralised sanitation at events
- Waternet's Innovation Hub at Prodock

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6 CLEAN WATER AND SANITATION

17 PARTNERSHIPS FOR THE GOALS

Winnovation

Collaboration is essential for innovation. The Winnovation platform – an initiative of Het Waterschapshuis – makes working together on innovative projects and issues accessible and fun. In the future, Winnovation will be the leading platform for innovation in the world of water, with Waternet as its natural connector.

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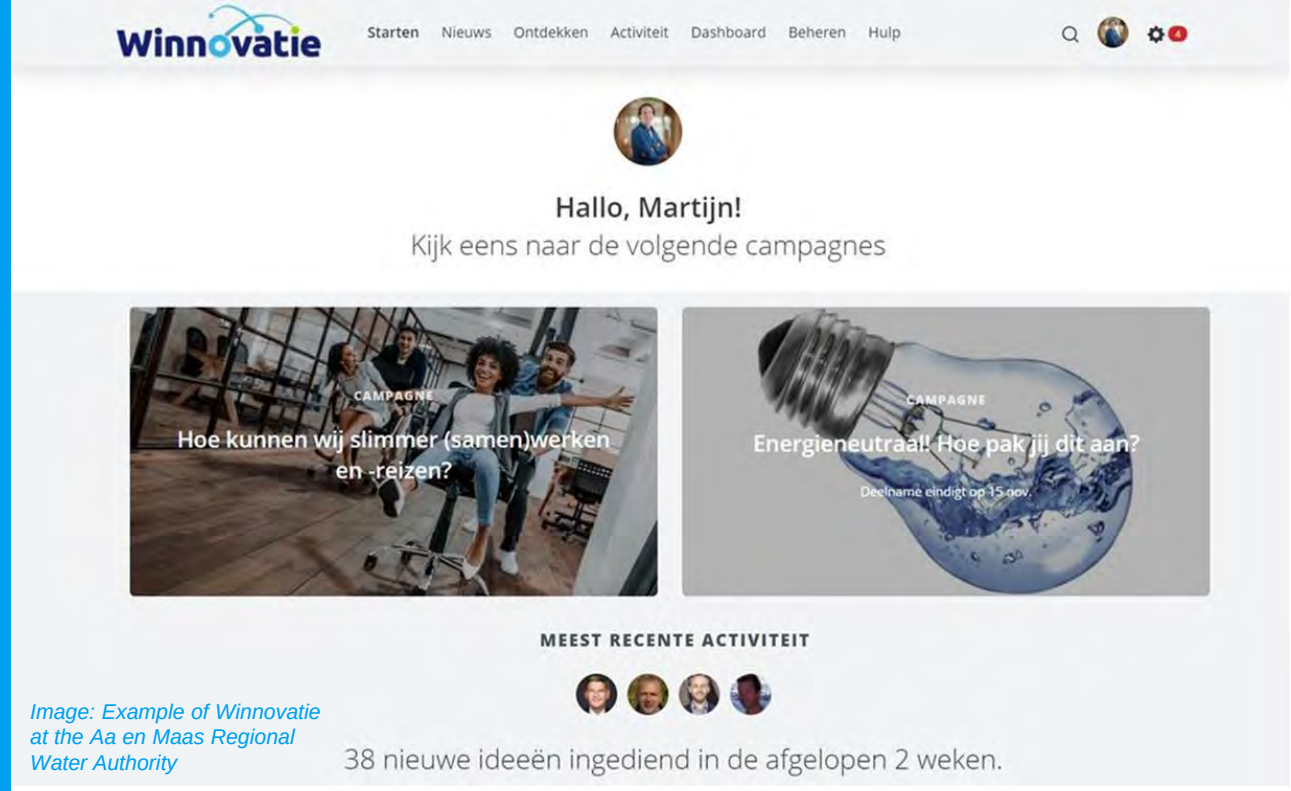


Image: Example of Winnovatie at the Aa en Maas Regional Water Authority

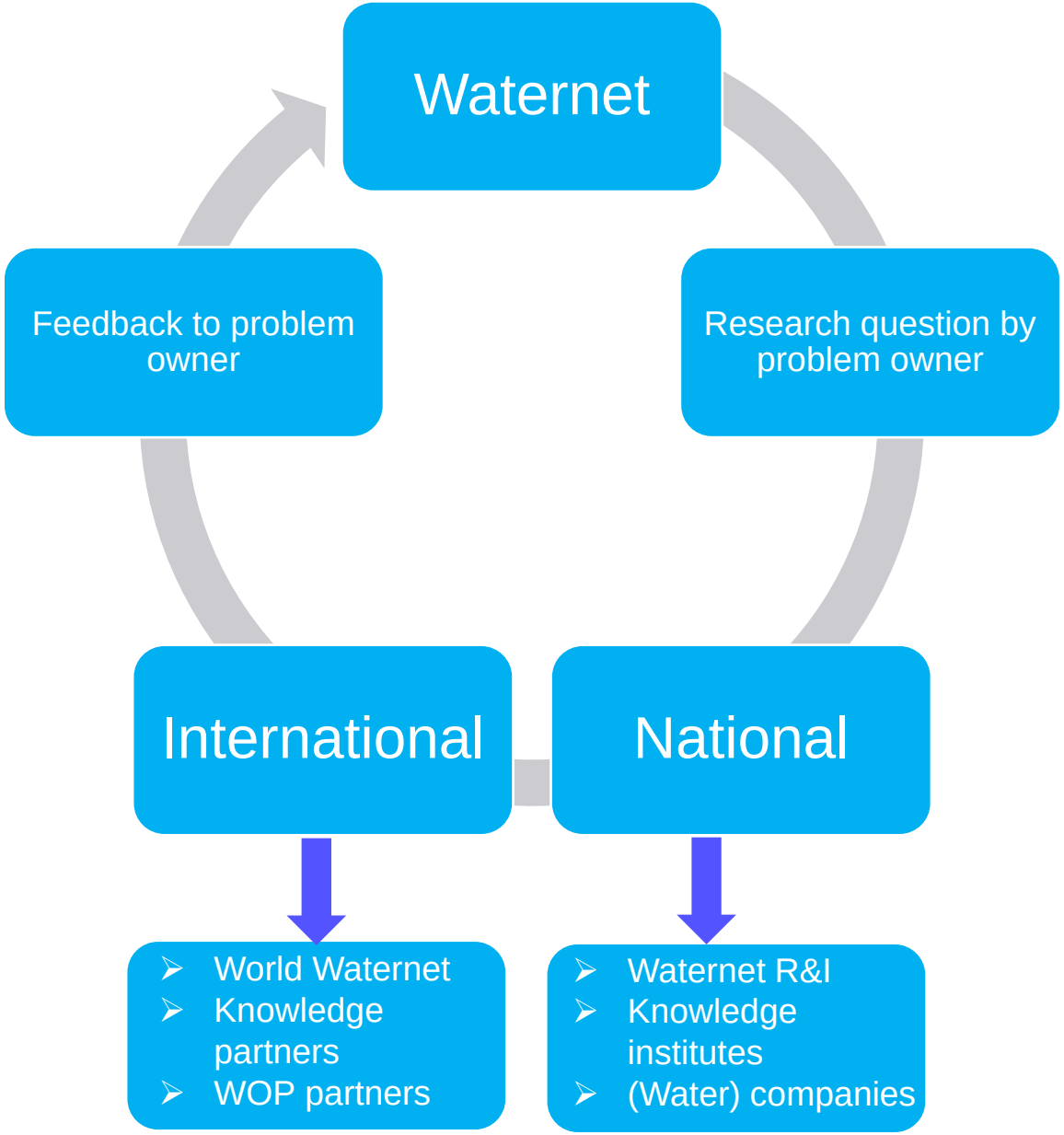
Winnovation will be implemented at Waternet in 2020. Waternet's innovation portfolio will be shared via Winnovation with affiliated water partners. This will avoid duplication of work and stimulate cooperation.

The platform will also be used to launch crowdsourcing campaigns looking for innovative solutions to Waternet's key challenges. By involving all employees in the campaigns, we can maximise the intellectual power and creativity of the organisation and increase engagement in Research & Innovation.

Further development of the Knowledge Agenda

This plan presents an initial outline for a knowledge agenda. Many issues still need to be worked out in more detail. We will then explore how to acquire the knowledge:

1. Identify the research questions of Waternet
2. Determine where to obtain the required knowledge
3. Obtain knowledge from Waternet itself (R&I programmes), from national partners or international partners (via World Waternet)



Like to read more?

- www.winnovatie.nl
- www.waternet.nl/en/innovation
- www.kennisactiewater.nl
- Waterbetrokken: Administrative Agreement of the Amstel, Gooi and Vecht Water Authority 2019-2023
- City of Amsterdam Coalition Agreement 2018

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Publisher

Waternet Innovatie, March 2020
Edited by: Alice Fermont and Jan Peter van der Hoek

Published by Waternet Innovatie